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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|----------------------|---------------------|------------------|
| 10/634,699 | 08/05/2003 | Jeong-Sik Cho | 5000-1-410 | 7562 |
| 33942 | 7590 | 03/17/2005 | EXAMINER | |
| CHA & REITER, LLC 210 ROUTE 4 EAST STE 103 PARAMUS, NJ 07652 | | | LEPISTO, RYAN A | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2883 | |

DATE MAILED: 03/17/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/634,699

Applicant(s)

CHO ET AL.

Examiner

Ryan Lepisto

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 August 2003.
2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1,2,4-13 and 15-19 is/are rejected.
7) ☒ Claim(s) 3 and 14 is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 05 August 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings/Specification

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "102" has been used to designate both external core and internal clad (page 9 line 1).

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action.

Claim Objections

2. **Claim 18** is objected to because of the following informalities: The claim ends in a comma instead of a period. Appropriate correction is required.

Claim Rejections - 35 USC § 103

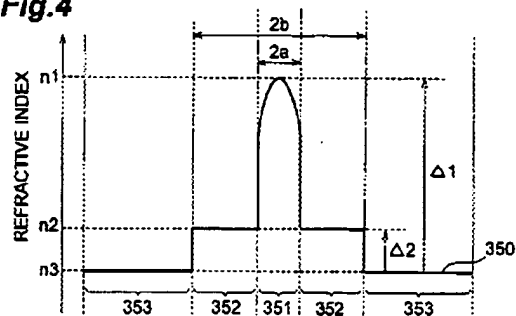
The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. **Claims 1-2, 4-13 and 14-19** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Kato et al (US 6,266,467 B1) (Kato)**.

Kato et al teaches a wide-band dispersion controlled optical fiber (column 2 lines 11-17) characterized with the refractive index profile from Fig. 4 and the parameters from Fig. 11 and 12 shown below:

Fig.4

| | 3rd Embodiment | 15th Embodiment | 17th Embodiment |
|---|----------------|-----------------|-----------------|
| Zero-dispersion wavelength (μm) | 1.42 | 1.46 (1.457) | 1.40 |
| Dispersion slope ($\text{ps}/\text{nm}^2/\text{km}$) at zero-dispersion wavelength | 0.079 | 0.060 | 0.071 |
| Dispersion slope ($\text{ps}/\text{nm}^2/\text{km}$) at wavelength $1.55 \mu\text{m}$ | 0.070 | 0.060 | 0.059 |
| Cutoff wavelength (μm) | 1.19 | 1.07 | 1.78 |
| Dispersion ($\text{ps}/\text{nm}/\text{km}$) at wavelength $1.20 \mu\text{m}$ | -20.8 | -20.2 | -17.4 |
| wavelength $1.30 \mu\text{m}$ | -10.6 | -11.1 | -7.7 |
| wavelength $1.45 \mu\text{m}$ | 2.1 | -0.6 | 3.5 |
| wavelength $1.55 \mu\text{m}$ | 9.3 | 5.7 | 9.7 |
| wavelength $1.60 \mu\text{m}$ | 12.8 | 8.7 | 12.8 |
| Bending loss (dB/turn) at wavelength $1.55 \mu\text{m}$ at diameter 32mm | 0.006 | 0.00006 | 0.00002 |
| Effective area (μm^2) at wavelength $1.55 \mu\text{m}$ | 63.6 | 45.3 | 60.3 |

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As is shown in the figure and table above (see also column 11 lines 11-64, column 20 lines 18-57 and column 21 line 39 through column 22 line 16) all embodiments (3, 15 and 17) teach dispersion at 1300 nm (O-band) between -12 and -4 ps/nm/km, dispersion at 1600 nm (L-band) between 8 and 14 ps/nm/km and positive dispersion at 1550 nm (C band), effective cross-sectional areas at 1550 nm of less than $75 \mu\text{m}^2$, while embodiments 3 and 15 teach a cut-off wavelength less than 1285 nm, embodiments 3 and 17 teach a zero dispersion wavelength below 1430 nm and embodiments 15 and 17 teach dispersion slopes at the zero dispersion wavelength of less than $0.074 \text{ ps/nm}^2/\text{km}$. Embodiment 3 teaches a bending loss at 1550 nm when wound at a diameter of 32 mm of 0.006 dB per turn, embodiment 15 – 0.00006 dB per turn and embodiment 17 – 0.00002 dB per turn.

All embodiments (3, 15 and 17) teach an internal core with a diameter d_1 (Fig. 4, 2a) (either $6.4 \mu\text{m}$, $4.8 \mu\text{m}$ or $7.5 \mu\text{m}$) and refractive index n_1 (Fig. 4), an external core which encloses the internal core having diameter d_2 (Fig. 4, 2b) (either $16 \mu\text{m}$, $15.1 \mu\text{m}$ or $29 \mu\text{m}$) and refractive index n_2 wherein the refractive index n_2 of the external core gradually decreases from n_1 away from the center of the internal core (cone shaped section, Fig. 4), an internal clad which encloses the external core and has a diameter d_3 (Fig. 4, 353) and refractive index n_3 resulting in d_1/d_2 relationships of 0.4, 0.32 and 0.26 respectively and wherein $n_1 > n_2 > n_3$ and Δ_1 is 0.60%, 0.65%, 0.61% respectively and Δ_2 is 0.10%, 0.06%, 0.10% respectively.

Kato does not teach expressly all the limitations of claim 1 in the same embodiment, teaching of the dispersion at exactly 1625 nm, difference of losses

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between exactly 1550 nm and 1625 nm of less than 0.03 dB/km, an additional clad enclosing the internal clad, a specific dispersion at exactly 1310 nm, a loss of less than 0.25 dB/km at exactly 1625 nm, or bending loss measured at 100 turns around a roller of diameter of 60 mm.

Kato does teach the limitations described above. Kato, as mentioned, teaches the dispersion of each embodiment at 1600 nm. It would be reasonable and obvious to one of ordinary skill in the art at the time of the invention to assume that the dispersion at 1600 nm is going to be very similar to the dispersion at 1625 nm, with maybe + 1 ps/nm/km more, which would still be in the teachings of all the embodiments mentioned.

Kato further teaches in Fig. 1A the overall loss characteristics of all of the embodiments of the invention. In Fig. 1A the transmission loss is virtually flat in the wavelength range of 1550 nm to 1625nm, and therefore it would be reasonable and obvious to one of ordinary skill in the art at the time of the invention to assume that the loss over that wavelength band is very small, if any, therein reading upon 0.03 dB/km or less as is stated in the applicant's claims. It would also be reasonable and obvious to one of ordinary skill in the art at the time of the invention to assume that the taught dispersions at 1300 nm would translate very closely to the dispersion at 1310 nm, especially since the claim languages call for a specific dispersion at substantially 1310 nm (the office will assume 1300 nm is substantially 1310 nm in this particular application).

Kato also teaches further embodiments, for example the one shown in Fig. 5 that includes an additional outer clad region (454) that encloses the inner clad (453) with

refractive index n_4 wherein the core regions are almost identical to the embodiments described above and shown in Fig. 4.

As described above, Kato teaches embodiment 3 teaching a bending loss at 1550 nm when wound at a diameter of 32 mm of 0.006 dB per turn, embodiment 15 – 0.00006 dB per turn and embodiment 17 – 0.00002 dB per turn. It would be reasonable and obvious to one of ordinary skill in the art at the time of the invention to assume that the bending loss as taught by Kato would read on the applicant's stated bending loss since Kato's bending loss is smaller than the applicant's claimed loss, even though the bending diameter is smaller in Kato. Kato's fibers would be expected to have even lower bending loss at a bending diameter of 60 mm as is claimed by the applicant.

Finally, in the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In *re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); In *re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify and combine teaches of similar embodiment of Kato's invention to optimize the properties of the fiber as needed in different settings.

The motivation for doing so would have been to increase efficiency and reduce size by creating a fiber with characteristics to have a fiber having large relative refractive index differences between cladding and core regions with low transmission loss and whose core region has a small diameter and still reduce nonlinear optical phenomena (Kato column 2 lines 5-32).

Allowable Subject Matter

4. **Claims 3 and 14** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

These claims would be allowable over the prior art of record, in particular Kato, if rewritten in independent form including all of the limitations of the base claim and any intervening claims because the latter, either alone or in combination, does not disclose nor render obvious a relationship between refractive index of the core and cladding layers listed in this claims, in combination with the rest of the claimed limitations.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following reference teach various aspects of the applicant's claimed invention: Kim et al (US 6,205,279), Lee et al (US 6,449,416 B1), Liu et al (US 6,434,310 B1), Liu (US 5,684,909), Peckman (US 5,878,182), Kner et al (US 6,181,717 B1), Judy et al (US 5,905,838), Tirloni (US 6,751,389 B2), Sarchi et al (US 6,577,800 B2), Tanaka et al (US 6,535,677 B1), Matsuo et al (US 6,546,177 B1), Sillard et al (US 6,819,850 B2), Kim et al (US 2002/0197036 A1), Sillard et al (US 2004/0013381 A1), Changdar et al (US 2004/0197063 A1).

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ryan Lepisto whose telephone number is (571) 272-1946. The examiner can normally be reached on M-F 7:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank Font can be reached on (571) 272-2415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

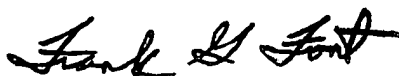
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Ryan Lepisto

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Date: 3/14/05



Frank Font

Supervisory Patent Examiner

Technology Center 2800